

WHAT IS CLAIMED IS:

1. A metal thin film of a semiconductor device comprising:
a barrier metal layer formed on a semiconductor substrate; and
a PVD seed thin film, a CVD thin film, and a PVD reflow thin film sequentially formed on the barrier metal layer, wherein the PVD seed thin film, the CVD thin film and the PVD reflow thin film are of the same material.
2. The metal thin film of claim 1, the PVD seed thin film, the CVD thin film, and the PVD reflow thin film are of Al or Cu.
3. The metal thin film of claim 1, further comprising an interleaving insulating film between the semiconductor substrate and the PVD seed thin film.
4. The metal thin film of claim 1, wherein the barrier metal layer is of any one of Ti, TiN and Ti/TiN.
5. The metal thin film of claim 1, further comprising an ARC layer of Ti/TiN on the PVD reflow thin film.

6. A method for forming a metal thin film of a semiconductor device comprising the steps of:

forming an interleaving insulating film on a semiconductor substrate and selectively etching the interleaving insulating film to form a contact hole;

forming a barrier metal layer on the interleaving insulating film including the contact hole;

forming a PVD seed thin film on the barrier metal layer;

forming a CVD thin film on the PVD seed thin film; and

forming a PVD reflow thin film on the CVD thin film to fill the contact hole and form a flat thin film on the interleaving insulating film.

7. The method of claim 6, further comprising the step of cleaning an internal portion of the contact hole and a surface of the interleaving insulating film by cleaning process using plasma.

8. The method of claim 6, wherein the PVD seed thin film, the CVD thin film and the PVD reflow thin film are of the same material.

9. The method of claim 6, wherein the PVD seed thin film is formed of Al or Cu with a thickness of 2000Å or less at a low temperature of 300°C or less and high power of 5kW or greater.

10. The method of claim 6, wherein the CVD thin film is formed at a thickness of 1000Å or less, and in case where the CVD thin film is of Al, an organic metal compound, such as dimethyl aluminum hydride (DMAH), $(\text{CH}_3)_2\text{AlH}$, dimethyl ethyl amine alane (DMEAA) and $\text{AlH}_3\text{N}(\text{CH}_3)_2(\text{C}_2\text{H}_5)$, or a blend material containing the organic metal compound is used as a precursor.

11. The method of claim 10, wherein the CVD thin film is formed at a deposition temperature of 150~300°C and a deposition pressure of 1~100Torr using a blend material in which adduct of a small amount is added to DMAH.

12. The method of claim 6, wherein the CVD thin film is formed at a thickness of 1000Å or less, and in case where the CVD thin film is of Cu, Lewis-base stabilized Cu(I)beta-diketonate or a blend material containing it is used as a precursor.

13. The method of claim 12, wherein the CVD thin film is formed at a deposition temperature of 100~300°C and a deposition pressure of 1~100Torr using a blend material in which tmvs and Hhfac Dihydrate (HDH) are added to Cu(hfac)(tmvs) as a blend precursor.

14. The method of claim 6, wherein, in case where the CVD thin film is formed of Al, the barrier metal layer is formed of Ti, TiN, or Ti/TiN, where Ti is deposited by ionized PVD process and TiN is deposited by ionized PVD or CVD process.

15. The method of claim 6, wherein, in case where the CVD thin film is formed of Cu, the barrier metal layer is formed of either any one of Ta, TaN, Ta/TaN, TiN, and Ti/TiN or Wnx, where Ta and Ti are deposited by ionized PVD process while Tan, TiN and Wnx are deposited by ionized PVD or CVD process.

16. The method of claim 6, wherein the PVD reflow thin film has a thickness less than 50% of the final thickness of the completed thin films.

17. The method of claim 6, wherein the PVD reflow thin film is formed by a deposition process performed at a temperature of 300°C or greater and power of 5kW or less or power of 5kW or greater so as to perform a subsequent annealing process, or by a deposition process performed using high power (5kW or greater) and low power (5kW or less) in turn.

18. The method of claim 6, further comprising an ARC layer of Ti/TiN on the PVD reflow thin film.